

ELECTORAL AREAS
A GOLDEN-COLUMBIA
B REVELSTOKE-COLUMBIA
C SOUTH SHUSWAP
D FALKLAND-SALMON VALLEY
E SICAMOUS-MALAKWA
F NORTH SHUSWAP-SEYMOUR ARM

MUNICIPALITIES
GOLDEN SALMON ARM
REVELSTOKE SICAMOUS



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November 26, 2014

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To: NICHOLSON PROPERTY OWNERS

RE: Groundwater Monitoring - Nicholson Aquifer

The Columbia Shuswap Regional District held a public meeting on October 29, 2014 at the Nicholson Elementary School to provide information collected as part of the groundwater quality monitoring program and the associated impacts from on-site septic systems to the groundwater aquifer in the community of Nicholson. This letter is intended to provide you with a synopsis of the meeting and provide subsequent information requested by community members at the meeting including: community water system costs and potential service area; costs related to the continuation of the groundwater monitoring program; and costs related to in-home water treatment systems.

The aquifer being monitored is referred to as the Nicholson Aquifer and the attached map identifies the aquifer's area. The map also identifies a potential service area if the continuation of monitoring is desired (Nicholson Aquifer). For evaluation purposes, Nicholson includes areas commonly referred to as the Habart Subdivision, the Canyon Creek Subdivision and the Nicholson Subdivision.

Definitions

An understanding of the following definitions will ensure a clear understand of the concepts presented:

Aquifer: an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be extracted using a water well.

Groundwater: is the water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations. A unit of rock or an unconsolidated deposit is called an aquifer when it can yield a usable quantity of water.

Service Area: A Service Area is created through a petition process led by the community to request a service within an identified area. 50% approval from property owners within the identified area is required in order for the CSRD to proceed with establishing the service. The length of time required to process, establish and deliver the service can be anywhere from 6 to 24 months, depending on type of service.

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Water Quality

Western Water Associates Ltd. is the CSRD consultants responsible for reviewing groundwater quality results. Western Water provided information at the meeting in regards to the overall trends in the groundwater, including the presence of indicators of septic influences. Conclusions and recommendations included:

- Water supply wells and septic fields are in close proximity to each other.
- The combination of a shallow water table and the proximity of the septic fields to wells creates risk for domestic well water quality to be impacted.
- Drinking water from all shallow wells should be disinfected and have nitrate removed.
- Until disinfection system(s) are in place, options include:
 - Boiling water prior to use;
 - Using an alternate water source (bottled); or
 - Performing regular water testing.

The annual reports and test results can be found on the CSRD website or using the link:

www.csr.bc.ca/services/groundwater-monitoring

In addition to these recommendations, Western Water has provided a memorandum which offers greater detail on the hydrology of the Nicholson aquifer and parameters that should be tested when sampling residential drinking water in the area. (See enclosure).

Cost for Services

The CSRD presented the following options to residents for consideration at the meeting:

Option 1 – Status Quo

The CSRD has now discontinued the groundwater monitoring program in the Nicholson Aquifer, which had historically been funded from a “special projects” fund. CSRD staff and the groundwater monitoring consultants are now confident that the results of the monitoring performed to date suggest that groundwater is being impacted by septic fields.

The Status Quo option would see no action taken by the CSRD and does not address the issue of continued contamination to the aquifer.

Option 2 – Groundwater Monitoring Program

The residents of Nicholson could petition the CSRD to establish a groundwater monitoring program. The average annual cost per household within the proposed service area would be **approximately \$60**.

Continued monitoring does not address the issue of contamination, it simply provides information on the extent and level of impacts.

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Option 3 – In-Home Water Treatment

Based on discussions with local service providers and feedback from the residents that were in attendance, the CSRD has revised the information presented. In order to adequately treat drinking water, an in-home water treatment system would need to consist of UV (ultraviolet) light and reverse osmosis. A system of this type would cost approximately \$2,000 - \$3,000 initially, with an annual maintenance as well.

There is a local service provider in the Golden area, however there may be others in Golden/Parson and beyond that can supply and install.

In-home water treatment requires maintenance and does not address the issue of continued contamination to the aquifer.

Option 4 – Community Water Treatment and Distribution System

The attached map outlines a proposed service area for a water treatment and distribution system. Using costing from recent CSRD water treatment system projects and a more accurate service area detail, a rough estimate of eight million dollars (\$8,000,000) was used for the cost of a treatment system and distribution system owned and operated by the CSRD.

Using a service area of approximately 400 parcels, the costs presented at the meeting remain relatively unchanged.

- \$1,500 - \$2,000 per house hold, per year for 20 years (no grant funding).
- \$500 - \$1,000 per household, per year for 20 years (with 2/3 grant funding).
- \$400 - \$750 per household, per year for maintenance of the system.

Community water treatment and distribution would solve the health risk issue but does not address the issue of continued contamination to the aquifer.

Summary

The groundwater in the Nicholson Aquifer is being impacted by septic influences, which is a health and environmental concern for both the aquifer and for drinking water purposes. Options to mitigate the health risk to humans involves treating the water, either through a community system or through in-home treatment. Mitigation of the impacts to the aquifer involve implementation of a community sewer system.

In 2014, the ground water monitoring program was discontinued and will not be reactivated unless or until the community expresses that indication through receipt of a formal successful petition. If a formal petition is received and is affirmative, a service area would be developed and only those residing within the service area would fund the monitoring program.

Yours truly,

COLUMBIA SHUSWAP REGIONAL DISTRICT

Per:

Ben Van Nostrand, P. Ag
Team Leader, Environmental Health Services

/pt
Encl.

Memorandum

RE: Summary of the Nicholson Area Groundwater Monitoring Program

TO: Hamish Kassa (CSRD)

DATE: November 6, 2014

FR: Bryer Manwell, M.Sc. P.Eng.

REFERENCE: 14-024-18 – M2

This memo provides a summary of the following:

- more detail on aquifer characterization, depth to ground water, directional flow of groundwater, the nature of the groundwater in the 3 specific subdivisions; and
- Provide details on in-home testing of water, what are the minimum parameters.

These excerpts are paraphrased from the 2013 annual report.

Nicholson Hydrogeology

There are two British Columbia Ministry of Environment (MoE) mapped aquifers over the Nicholson area, aquifer 454 and aquifer 450. Both are considered unconsolidated surficial aquifers comprised of sand and gravel. Aquifer 454 is part of the regional Columbia River Alluvial Aquifer system and is approximately 4 km² in area. It is classified by the MoE as having moderate demand, moderate productivity and high vulnerability. The Canyon Creek Subdivision is located atop Aquifer 454, and the depth to groundwater for wells in the Canyon Creek area averages approximately 7 m (23 ft) below ground surface (bgs). Two provincially registered well logs indicate the aquifer is about approximately 35 m (115 ft) thick. The regional groundwater flow direction in this aquifer is southeast to northwest, sub-parallel to the Columbia River. The estimated hydraulic gradient of the regional Columbia River Aquifer in the vicinity of Nicholson is very low, at approximately 0.08%.

Aquifer 450 is a local-scale alluvial fan aquifer approximately 3.3 km² in area and feeds into the regional Columbia River Aquifer System. The local groundwater flow direction in Aquifer 450 is inferred to be westerly before the flow joins the regional system. Well logs and a topographic map indicate that the calculated hydraulic gradient of Aquifer 450 is much steeper than the regional hydraulic gradient, and is estimated to be 5%, meaning groundwater will flow more quickly through aquifer 450 compared to the regional aquifer 454.

Aquifer 450 is classified as having a low demand, moderate productivity, and moderate vulnerability to contamination. Borehole logs for water wells screened in Aquifer 450 indicate that the aquifer is a semi-confined gravel aquifer. The Habart and Nicholson subdivisions are located atop Aquifer 450. Based on well logs available from the B.C. Water Resource Atlas, the average depth to water in wells in the Habart Subdivision is approximately 17 mbgs, and the average well depth is 26 mbgs (MOE 2014). The average depth to water in wells in the Nicholson Subdivision is approximately 10 mbgs, and the average well depth is 20 mbgs (MOE 2014). A study of aerial photographs for the Site (MOE 2012) suggests that the Habart Subdivision is located on the Stacy Creek fan, whereas the Nicholson Subdivision is located on the inside bend of a meander of the Columbia River and may be influenced by waters from both aquifers.

In-home Water Quality Testing

We recommend the following septic associated water quality parameters to be sampled from domestic wells on a regular basis to monitor the degree of impact at the domestic wells:







- anions (bromide, chloride, fluoride, and sulphate);
- nutrients: ammonia (as N), nitrate (as N), nitrite (as N), orthophosphate, dissolved phosphorus; and
- bacteriological: *Escherichia coli*, fecal coliforms, total coliforms.

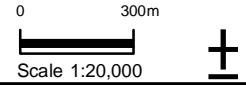
Town of Golden



NICHOLSON AQUIFER

Legend

-  House Point
-  Aquifer
-  Service Area
-  Parcel Boundary
-  Municipality
-  Parks



Columbia Shuswap Regional District
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Date: 11/7/2014
No representation or warranty is made as to the accuracy of the information.

